

AN APPLICATION OF MARKOV PROCESSES
TO GROUP STATISTICS OF
OCEAN WAVES IN SOUTH WEST OF SRI LANKA

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Run length of ocean waves have significant effects on coastal engineering problems such as (1) stability of rubble mound, (2) oscillation of moored vessels, and (3) drainage of overtopping discharge.

Kimura¹ has presented a theory for run length for the case of mutually correlated wave heights. It is assumed that the zero upcrossing wave heights form a markov chain of which transition probabilities are given by the 2-D Rayleigh Pdf.

In this paper three methods are utilised to obtain the shape parameters for the Rayleigh Pdf and the results are compared. The results for a given time series resulting in the 18 degree of freedom spectrum (Fig.1) given below are indicated in Fig 2 a, b, and c.

The results are discussed for deferring shapes of spectra for storm data collected by a wave data buoy at Galle in depth of 20m. The initial analysis indicates that the method given by Arhan and Ezraty indicated by Battjes² where the shape parameter given by

$$k(\tau) = \left| \int_0^{\infty} E(f) e^{i2\pi f\tau} df \right| / m_0$$

$$\text{where } k = k(\tau) \text{ for } \tau = T_x = (m_0/m_2)^{1/2}$$

and the method formulated by Kimura¹ does not give as good a result as a much simpler method which utilizes the fact that K^2 is the linear correlation between H_n^2 and H_{n+1}^2 i.e consecutive wave height square.

- References:
1. A Kimura - Statistical properties of random wave groups.
Proc. 17th ICCE. Sydney 1980, pp 2955-2973
 2. J.A. Battjes & G.Ph. Van Vledder - verification of Kimura's theory for wave group statistics
Proc. 19th ICCE pp 642-648, Spain. 1988.

